Value of portable extinguishers

By G. V. Blackstone, Chief Officer Hertfordshire County F.B

The Fire Service is interested in the development of portable extinguishers because it uses them for small fires when it is unnecessary to put its larger apparatus to work and because their efficient and proper use by the public prevents many small fires from becoming big fires.

Probably the oldest form of portable extinguisher is the fire bucket; certainly amae (buckets) are listed by Ulpian among the gear carried by the Vigiles, the large and well-equipped fire brigades of Imperial Rome, and Agricola in his "De Re Metallica," published in 1548, shows an illustration of a metallurgist at work with a neat "fire point" on the wall of his workshop, which includes among its gear three hanging leather buckets. The fire bucket is still a common first aid appliance and may be seen, red painted, and sometimes regrettably half empty, hanging on its hook in factory, railway station, and even hotel. It has two disadvantages. The first is that a bucket has many other uses and is apt to be borrowed and missing from the fire point at the time it is urgently needed; the second, as was pointed out in the verbose report of the Royal Commission on Fire Brigades and Fire Prevention of 1921, is that its "utility is limited by the impracticability of throwing the water above the headline."

It is also a wasteful method of applying water to a fire, for the amount available cannot be directed with any accuracy nor can the speed of application be controlled. The best extinguisher is one that is easily portable, without spillage, is simple to operate, and will produce a strong jet of water which can be directed first into the heart of the fire and afterwards if necessary on to any surrounding materials which may have been ignited. The first extinguisher to fulfil such requirements was designed in 1816 by Captain Manby of Yarmouth, well known for his invention of the rocket line for the rescue of sailors from shipwreck. It was a cylindrical copper container partly filled with water, the remaining air then being compressed by means of a hand pump. The turning of a small cock at the base of the incorporated nozzle allowed the compressed air to drive the water out in a jet.

The use of a hand pump to supply the necessary pressure was an expensive and undesirable complication and leakage of air could make the extinguisher ineffective when the emergency arose. Consideration was therefore given to the design of an extinguisher in which the pressure for expelling the water in a jet was not produced until the moment for use arrived. This was achieved in the latter half of the nineteenth century by putting sodium bicarbonate in the water with which the extinguisher was filled and incorporating a small glass bottle of sulphuric acid which could be broken by depressing a plunger on the outside of the casing.

The mixing of the acid with the soda impregnated water produces a considerable quantity of carbon-dioxide gas in the small empty space above the water, and the pressure of this gas drives the water in a strong jet through the nozzle. For the majority of fires which involve wood, fabrics, and ordinary carbonaceous material nothing is more effective than the powerful and easily directed water jet of this type of extinguisher, which is still manufactured and sold in great numbers. Its modern competitor is a water extinguisher in which the gas required as propellant is stored under pressure in a cartridge container. The sealing disc of this cartridge is pierced by a pointed striker when the operating knob is depressed and the compressed gas escapes and drives the water through the nozzle. The advantages of this more modern type are that only pure water is ejected, that anti-freeze compounds may be added if the extinguisher is positioned at an exposed site, and that the apparatus can be rapidly recharged and used again.

These water-ejecting extinguishers are ineffective and dangerous on fires involving petrol, oil, and electrical apparatus. Here the fire must be smothered by an inert gas or a blanket of foam which will float on petrol and exclude the air. The most popular and effective hand extinguisher for petrol fires in motor-cars is the one which ejects carbon tetrachloride by the operation of a small hand pump. This liquid vaporises on coming into contact with heat and forms an inert gas which cuts off oxygen from the fire and smothers it. Methyl bromide is even more effective, but the fumes from its operation are so toxic as to be dangerous to the operator and other persons in the vicinity, and these extinguishers should only be installed where likely operators have a thorough knowledge of the danger. Carbon tetrachloride fumes are also toxic to a lesser degree, and these extinguishers should not be used in confined places where the operator is likely to inhale a heavy concentration of the vapour.

Small free burning petrol and oil fires are best dealt with by foam extinguishers. These have varied little in basic design since their introduction at the beginning of the present century. Foam being lighter than petrol or oil will float on the burning surface and cut off the oxygen from the fire, whereas water will sink to the bottom and may spread the fire by causing the burning liquid to overflow if in a container or to spread to other combustibles.

The latest development in fire extinguishers is the introduction of improved dry powder types. Dry powder extinguishers operate by smothering the fire and excluding oxygen from the burning material. They are, in fact, a development of the bucket of sand or earth which had its place at the fire point alongside the water bucket centuries ago.

The modern portable fire extinguisher, made by one of the first-class manufacturers, is an efficient piece of apparatus which has involved much skill and experience in design and manufacture The Fire Service would like to see more of them installed, especially where hazardous materials are stored or hazardous processes are carried out. This would save the Service many difficult working jobs, for, as Shakespeare said some three hundred years ago, "A little fire is quickly trodden out, which being suffered rivers cannot quench."

Gypsum lining

By Harry Howard

The arts of casting and modelling in gypsum plaster have been known for almost as long as the material itself; centuries ago, large slabs, plain and ornamental, reinforced with hair, sticks, or rags, were devised for use in building. These were the forerunners of the modern fire-resisting Gypsum Plasterboard, a lining material which consists of an incombustible core of gypsum plaster encompassed by sheets of stout liner.

Its popularity as a fire-resisting building material increases steadily and over a million square yards a week are produced in Britain. It is obtainable in a wide range of sizes, up to 12ft. long by 4ft. wide; it is stable and does not warp or buckle; it does not expand or contract after being fixed; its surface is ready for immediate decoration without expensive preparatory treatment. Veneered with aluminium foil it is an excellent and inexpensive thermal insulating material complying with the requirements of the Thermal Insulation (Industrial Buildings) Act both as regards its effectiveness for thermal insulation and for fire resistance. Fixed round columns and beams, it protects the structural steelwork, too, from the effects of fire.

Gypsum's important property of resistance to fire is inherent in its chemical composition. It is a crystalline form of calcium sulphate containing a large amount of "entrained" water. This must be driven out before its temperature can rise and the material cease to act as a fire barrier. It does not burn or explode under heat and does not give off dense volumes of smoke. Plasterboard half an inch thick withstands fire for some half an hour. The "fire cover" in this country provides for the attendance of the fire brigade in populated areas within five minutes of an alarm being received